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ABOUT THE COVER:
Depicted are end use markets that use precision metal parts and the precision metal industries, themselves, all reviewed in the State of the Industry Report. Also shown is an upward trend, indicative of an improvement in the general economy.
Artwork by Thon Von der Lippe.

A recent improvement in the economy has done little to suppress the skepticism of executives in the precision metalworking industries. The economic instability of the past few years and the continuing threat of imports has added to the general feeling of uncertainty about the future.

This uncertainty is a stumbling block to growth in domestic metalworking. High interest rates and questions about the state of the markets that use precision metal parts have generated fear to invest in capital equipment. Even so, there are companies that have used the recent lull in business to modernize and make capitol investments.

Diversity of market seems to be the key to survival in these shaky economic times. Custom producers with a wide customer base are generally doing better that those who have locked onto one or even two end use markets. For custom producers with a limited customer base, the effect of even a mild recession can be devastating.

This year's State of the Industry Report looks at two key elements in metalworking. The first element is *End use markets.* We selected seven key market areas and collected information about past, present and future consumption of various precision metal products. This should be useful to the custom producer in anticipating demand for his product.

The second element we call *Industry reports,* a special report on the seven basic metalworking processes PRECISION METAL covers editorially. Within this section are interviews with association and company executives to gain their insights about the future (or plight) of their respective industries. The results of a survey we conducted among the producers of capital equipment and materials are also featured in this section.

The overwhelming message we received in our interviews and surveys is simple: the economy is picking up. Industries that are geared up to a resurgence in economic activity will prosper in the coming years.

End use markets

By Randolph Gold, editor
Michael Keating, senior market analyst

Aircraft

Increased competition has forced airlines to change their aircraft-buying habits. According to a securities analyst at Kidder, Peabody, "There is no cyclical wave of buying as in the past. Each airline will buy selectively." One positive sign for future aircraft orders: the International Air Transport Association (IATA) predicts 1985 net operating profits should reach $200 million, about even with 1984. That profit picture is a far cry from the net loss of $250 million IATA's members reported in 1983.

Intermediate-sized aircraft and corporate jets are two bright spots in an otherwise sluggish commercial aircraft market. The latest Standard and Poor's industry survey for the aerospace market notes that many of the new feeder and commuter airlines have ordered smaller, intermediate-sized planes. According to an official at the Forging Industry Association, "Airlines want smaller passenger jets, so orders for the McDonnell-Douglas MD-80 and Boeing 737-200 and 300 are going very well. This could translate into increased business for aerospace forging producers in 1985."

The drawing of a new Boeing 737-300 shows some of the major changes in materials and manufacturing technology used in its construction. The most notable changes are the replacement of aluminum structures with graphite composites. All flight control surfaces will be made of composite materials. But we are still a long way from an "all plastic" airplane. New aluminum alloys will be used in the strengthened wing, and more aluminum, in roll formed, sheet and plate form, will be used to extend the body 44 and 60 in. as shown.

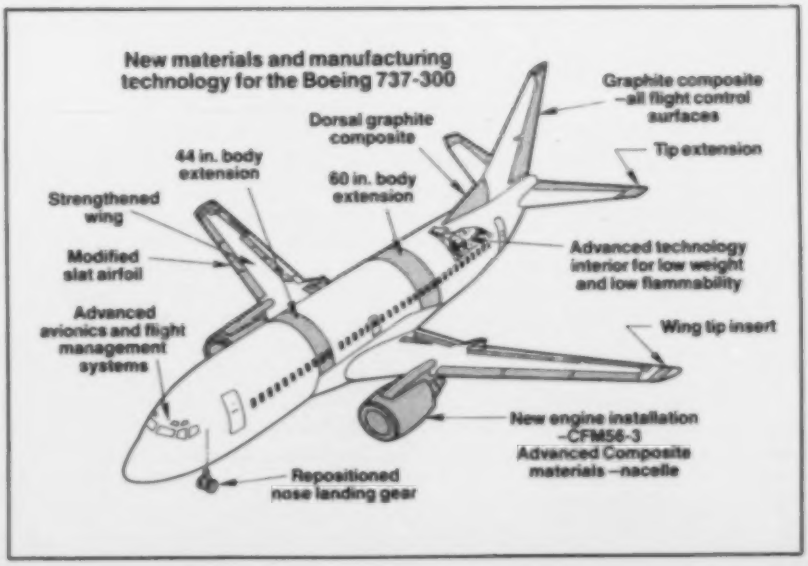
Advanced avionics and flight management systems will use a wide range of new precision metal parts, from investment castings to P/M parts, die castings and extrusions. Stampings will be used in applications such as attachments in electronic equipment , lead frames for integrated circuits and the multitude of electrical connectors used in an airplane.

The repositioned nose landing gear will undoubtedly call for new forging part numbers for gear

Costs of some precision metal products consumed by the aircraft industry (in millions of $ delivered cost)

Process and material used	1977	1982	(est) 1985
Castings, rough and semifinished (steel)	5.5	3.8	5.1
Castings, rough and semifinished (aluminum)	34.2	39.7	52.8
Extrusions (aluminum)	63.2	83.4	110.9
Forgings (steel)	27.9	15.5	20.6
Forgings (aluminum)	45.5	63.6	84.6

Sources: U.S. Census Bureau, Predicasts


New materials and manufacturing technology for the Boeing 737-300
Graphite composite –all flight control surfaces
Dorsal graphite composite
Tip extension
44 in. body extension
60 in. body extension
Strengthened wing
Modified slat airfoil
Advanced technology interior for low weight and low flammability
Advanced avionics and flight management systems
Wing tip insert
New engine installation –CFM56-3
Advanced Composite materials –nacelle
Repositioned nose landing gear

mounting hardware, as well as forgings for the landing gear itself.

A marketing executive for a major investment casting operation is also optimistic about 1985 shipments for intermediate-sized jets. His firm produces a variety of investment castings for the Boeing model 737-300.

A manager of a Cleveland-based forging company reports that orders have slowed to a trickle for his firm's titanium forgings used on the Boeing 757 and 767 aircraft. Researchers at Standard and Poor's predict Boeing will ship 47 of these models in 1984, down from 80 in 1983.

As the economic recovery continues, more firms are upgrading or expanding their fleets of corporate aircraft. *Kiplinger Washington* editors have recently predicted a 30% increase in deliveries of corporate jets for all of 1984. The same report, though, predicts continued slow sales for small private planes.

Despite the strong dollar, exports of non-commercial aircraft could grow somewhat in 1984 and 1985, predicts an official at the General Aviation Manufacturer's Association. He sees increased sales to Europe for "everything from small single-engine trainer to twin-engine intercontinental business jets."

An average Lockheed C-5B military transport contains 25,000 forgings (2800 in a single engine).

A Boeing 737-200 (above) and a new Boeing 737-300 (below). Apart from a total of 104 in. of body extension, the only other obvious change is the use of CFM56-3 high-bypass ratio turbofan engines. Subtle changes include graphite composite materials on all flight control surfaces, and a repositioned nose gear.

Many producers of aerospace forgings are therefore keeping their fingers crossed as Congress debates the latest military procurement budget package.

One manufacturer that is keeping tabs on the military aerospace budget is Imperial Clevite's Powder Metal Products Div. in Salem, IN. Imperial Clevite would like to sell the Army and General Dynamics the benefits of the producer's titanium nose cones. The cones can be used on the Stinger shoulder-fired portable missile/air defense system.

Automotive

Crystal-ball gazing for 1985 has just started at the U.S. Commerce Dept., but already analysts are predicting increased auto sales. Automobile sales should reach 11 million units, and trucks four million. That is up considerably from the 10.5 million and 3.8 million projected for all of 1984, according to the deparment's International Trade Administration. Paine Webber has made some equally rosy forecasts. It does not see any sales let up until 1986.

Chrysler's line of minivans (Plymouth Voyager, Dodge Caravan and Dodge Mini Ram Van) is currently selling faster than the factory can make them, and should continue to move well. Chrysler's market researchers predict sales in 1984 should reach 230,000 units. Ford and Chevrolet, though, will be introducing their own minivan versions in 1985. A potential problem for Chrysler is its UAW contract, which is up for negotiation in October 1985.

The coming year will also see the introduction of Chrysler's H-body, a five-door sports sedan. The paint on the H-body will provide hidden frame and body members with a thicker primer coat than was possible with older spray processes. All of the primer will be applied in one coat. Chrysler's highly automated Sterling Heights, MI plant, where the H-body will be assembled, is installing PPG's new Uniprime electrocoat paint system. Chrysler is also

adding more galvanized steel to its vehicles for added corrosion protection. Eventually, up to 90% of the sheet metal in each vehicle will be galvanized, and the H-body is no exception.

At Ford, new stamping presses are going into three assembly plants: Chicago, IL; Buffalo, NY; and Walton Hills, OH, in late 1984 and 1985. The presses, with price tags in the millions, according to Ford's public affairs office, have built-in process control, to be used with Ford's ongoing statistical process control program. Ford is going the high-tech route on its Taurus model, its entry into the full-sized, front wheel drive class. The Taurus is scheduled to debut in 1986. Plans call for CAD/CAM production of 90% of Taurus' outer body panels. The use of CAD/CAM should reduce lead times for tooling production and improve the accuracy of the stampings, and therefore the fit of body parts in the finished vehicle.

Jim Reid, Sr. at Midwest Precision Castings in O'Fallon, MO, says his firm's high-temperature alloy chain is selling well to Chrysler, Ford and GM production plants, even as far away as Brazil. The chain withstands temperatures in the 1500 to 1800F range, and is used in heat treating furnaces to process motor vehicle gearing. Sand, shell and investment casting processes are used to produce the gearing. Says Reid, "In some plants, the chain has not been used for several years, so we have been busy with replacement orders and orders for new plants." Midwest's 1984 orders are up 15 to 18% over 1983, and its backlog has reached 12-14 weeks.

As the prices of new cars keep going up, people are keeping their "old" cars longer, which is good news to the automotive aftermarket and replacement parts manufacturers. Federal Mogul's researchers predict that sales of replacement piston rings, condensers and breaker point sets and other items in the automotive aftermarket should grow 2.6% plus inflation between 1984 and 1985. Import's share of the part aftermarket should reach 10%, though, according to a Federal Department of Transportation market study.

Over the long haul, plastic will continue to replace some metal components in motor vehicle production. However, plastics use has largely been relegated to trim and non-structural applications. For the highly loaded parts in suspensions, drive trains and engines, there will probably never be a substitute for metal parts in regular production cars. Even with today's high level of plastic usage, the value of plastic in an auto constitutes less than one percent of the vehicle's total cost.

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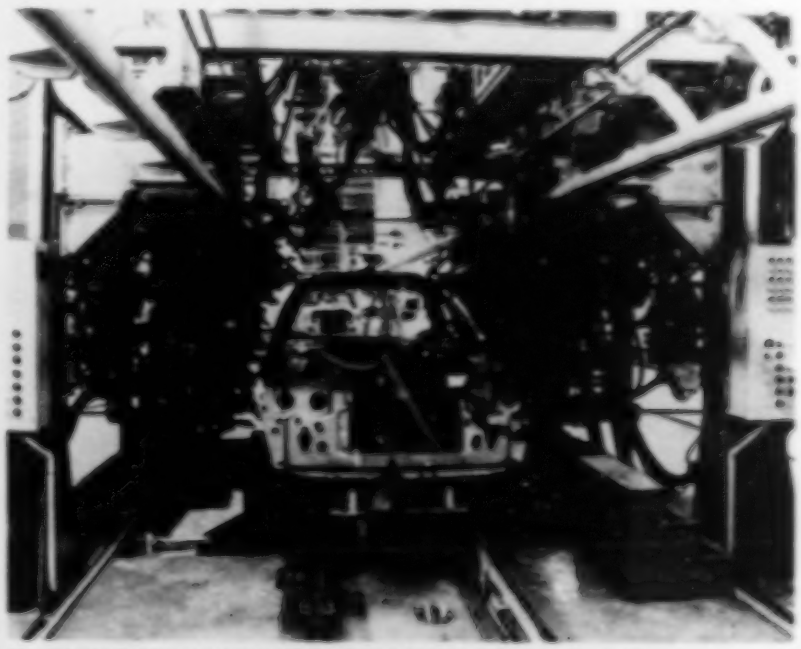
Costs of some precision metal products consumed by the automotive industry (in millions of $ delivered cost)

	1977	1982	(est) 1985
For car bodies			
Extruded shapes	N/A	21.3	26.0
Castings (iron-gray and malleable)	N/A	385.4	470.2
Castings (steel)	60.4	43.6	53.2
Forgings (iron and steel)	N/A	78.3	95.5
For truck and bus bodies			
Castings (iron-gray and malleable)	2.1	1.1	1.65
Castings (steel)	1.4	.7	1.05
Castings (aluminum and aluminum-based alloy)	.7	1.4	2.10

Sources: U.S. Census Bureau, Predicasts



Chrysler's Sterling Heights, MI plant is building 155 Chrysler LeBaron GTS and Dodge Lancer bodies in this automated manufacturing device before the start of the 1985 model year production. The pre-production bodies are used for training personnel, and for testing the high-tech equipment and processes.

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Energy exploration

"Encouraging" and "optimistic" are two words that come up when talking to metalformers who supply oil and gas drillers.

Cameron Iron Works in Houston, TX, describes sales of extrusion and powder metal products as "encouraging" for 1984 and 1985. Cameron's large-diameter, thick-wall extruded pipe (AISI 4130) ties pipelines to ocean drilling platforms. Sales of Cameron's other drilling products (such as blow-out preventers) are still slow because customers are still working off inventories of parts built up two years ago.

Carpenter Technology's new rotary forge is a sign of the firm's optimism about the energy exploration marketplace. The forge, built by GFM of Austria and installed at Carpenter's Reading, PA, plant during the past year, produces nonmagnetic oil drill collars and other specialty steel products. The collars are installed at the bottom of exploration drill strings. Their nonmagnetic quality is essential to minimize interference with electronic exploration gear.

According to Carpenter's hot finish product manager, you would have to travel to China or England to see a larger rotary forge. In addition to buying new equipment, Carpenter is streamlining its production processes in anticipation of increased orders.

Metal parts producers investing in high technology are benefiting the end users in energy exploration. Crucible Compaction Metals Operation has produced wellhead components for deep sour gas wells that offer improved economies. By hot isostatically pressing a layer of highly corrosion-resistant 625 alloy (a material comprising Cr, Mo, Fe, Cb and C) to a forged 4130 steel valve body, much longer wellhead component life is obtained, and therefore better economy for the drilling rig operator.

C-E Beaumont in Houston, TX, a producer of stainless and other steel forgings used in oil and gas wellheads, has not made any expansion plans or production improvements. According to officials in its engineering department, "We are waiting for the market to improve so our cash flow will also improve." Forecasters in C-E Beaumont's sales office, though, point to the following as signs of a 10 to 15% increase in U.S. drilling in 1985 over 1984:

- Reduced oil production among OPEC members and in the U.K.
- Increased worldwide oil consumption
- Oil/gas drillers are starting to whittle away at their inventories of wellhead parts (such as bonnets, tubing heads and casing heads).

Costs of some precision metal products consumed by the oil field machinery industry (in millions of $ delivered cost)

Process and material used	1977	1982	(est) 1985
Castings (iron-gray and malleable)	33.7	170.9	174.3
Castings (steel)	77.7	237.8	242.6
Castings (aluminum and aluminum-based alloy)	N/A	5.1	5.2
P/M parts	18.2	56.1	57.2
Forgings (iron and steel)	57.4	226.6	231.1

Sources: U.S. Census Bureau, Predicasts

Energy exploration is a large market for forgings used in rock bits, tool joints, blowout preventers, valves, pistons and liners. P/M, pressed isostatically, is also finding its way into oil drilling gear. Photo courtesy of Sohio.

Heavy forgings are not the only types of metal parts that go into energy exploration equipment. Through 1988, aluminum die casters and other metalformers can expect steady business from oil field machinery producers, according to the U.S. Commerce Deparment's aluminum castings analyst. Total industry shipments of oilfield machinery should grow four percent annually through 1988, says the Commerce Department, assuming oil consumption continues to rise. Standard and Poor's analysts say lower equipment costs (including "bargain" prices for tubing and casing) could stimulate more drilling in the future.

Farming equipment

"We are looking for increased sales of harvesters, corn planters and other farm implements in 1985," predicts Robert Schnell, executive vice president of the St. Louis-based Farm Equipment Manufacturers Association. "Many farmers have deferred purchases of farm equipment," Schnell continued. "One factor that could help stimulate sales is a continued rise in crop prices."

Someone who shares Schnell's optimism is Richard Rush, president of Rush Metals, Inc., in Billings, OK. Says Rush, "We're quoting a lot of agricultural equipment for Hesston, John Deere and some chain saw producers. We've had a good first six months, but the market has been somewhat depressed, though." Rush produces P/M parts in iron, brass and bronze that are used on corn planters, harvesters and combines.

One PRECISION METAL reader, a production engineer at Roesch, Inc., in Belleville, IL, helped his firm choose a new 60-ton turret punching machine. The unit will stamp out sheet metal parts in metal up to ⅜ in. thick for harvesters and other farm equipment in 1985. Roesch provides draw, die and progressive stampings to many farm equipment OEM's.

Jeffers Metal Products Mfg. Co. in Jeffers, MN, however, is waiting for some 1985 orders from some of its larger farm equipment customers before ordering new puch press or CNC milling equipment. Jeffers manufactures tractor hitches and ridge cleaners that attach to mechanical planters.

The farm equipment market is not what it used to be, according to a Midwestern investment caster. International Harvester, for example, formerly ordered 1500 to 2000 pieces of a given 8620 steel part. Now, says the investment caster, they order only 200.

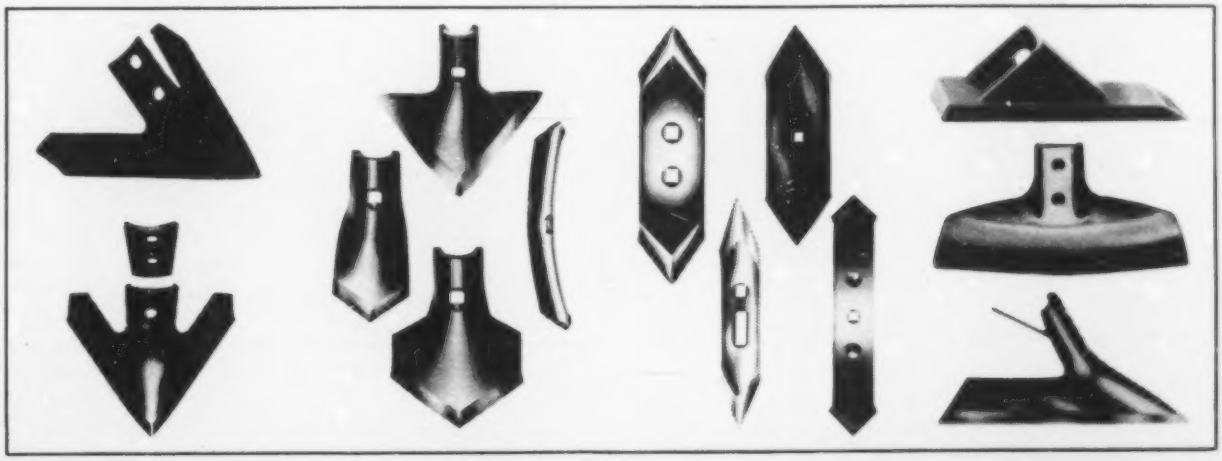
Sales in 1985 of most kinds of tractors should match 1984 totals, according to the Farm and Industrial Equipment Institute's latest "State of the Industry Update." The institute's manufacturer-members predict a three percent rise in the sales of tractors under 40 horsepower. This could translate to increased sales of metal parts such as die castings, P/M parts, forgings and investment castings used in hydrostatic drive units. The picture for larger fourwheel drive tractors

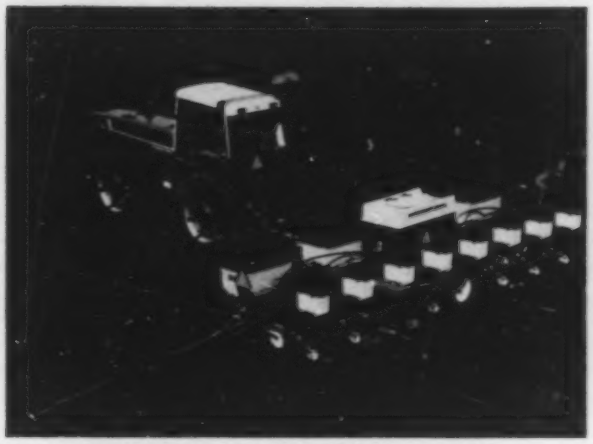
Costs of some precision metal products consumed by the farming equipment industry (in millions of $ delivered cost)

Process and material used	1977	1982	(est) 1985
Metal stampings	48.2	68.0	105.4
P/M parts	3.5	.6	.9
Castings (iron-gray and malleable)	371.4	220.2	341.3
Castings (steel)	20.7	41.8	64.8
Castings (aluminum and aluminum-based alloy)	15.9	18.3	28.4
Castings (copper and copper-based alloy)	N/A	5.7	8.8
Castings (other nonferrous)	N/A	5.9	9.1
Forgings (iron and steel)	96.9	89.9	139.3

Sources: U.S. Census Bureau, Predicasts

These are typical of the tillage tools produced by the Empire Plow Co. Tools such as these are used for cultivating and tilling the land, and are generally forged from high carbon steel and heat treated.





The new IH 800 series Early Riser planters use die castings, forgings, stampings and P/M parts to help farmers get seed into the ground as fast as possible with maximum efficiency. Photos courtesy of International Harvester.

IH's 496 flexible-wing tandem harrow offers accurate depth control and reduced soil compaction. It has IH's new forged Earth Metal disk blades that are up to 30% stronger and last up to 20% longer than conventional steel blades.

is considerably brighter, however. An 18% increase in the sales of four-wheel drive units is predicted. This will probably mean a larger market for the types of metal parts that go into heavy equipment, including forgings for track links and rollers, axles, steering mechanisms and gearing, and heavy stampings for hitches and tillage implements. Total tractor sales could be up seven percent.

Improved food exports and a new government-sponsored farm loan bailout program are two reasons why some of the institute's members are optimistic about 1985 sales.

Home appliances

U.S. factory shipments of ranges, air conditioners, refrigerators, microwave ovens and other appliances should exceed 36.5 million units in 1985, according to forecasts from the Chicago-based Association of Home Appliance Manufacturers (AMHA). This should come as good news to the producers of precision metal parts that are used by the home appliance industry.

Paul Roman, the AMHA's vice president of marketing and international trade, lists these reasons why 1985 shipments should top those projected for 1984 by at least half a million units:

- Pent up demand for appliances bought in 1973 (a record year for shipments) which are ready for replacement. This should translate to a demand for precision metal parts used in major appliances. This is in contrast to the essentially constant demand for parts used in smaller appliances which have shorter life cycles.
- Hot, humid weather for the past two summers has driven people into appliance showrooms to buy room air conditioners and dehumidifiers. This will create a demand for P/M parts and forgings used in refrigeration systems, and extruded aluminum tubing used in high efficiency heat exchangers. Roll formed shapes for decorative trim, stampings for structural components, and die castings for control housing will be called for to satisfy the demand for these types of end products.
- Booming microwave oven sales, 7.25 million expected to be shipped in 1985, should create a demand for die castings, aluminum extrusions, roll formed shapes and stampings for structural as well as decorative parts. A growing number of senior citizens and two-income households should continue to stimulate the sales of microwave ovens.
- Imports, says Roman, will keep taking significant percentages of the U.S. market, but are limited to smaller refrigerators and small appliances.

Die casters serving the appliance industry should enjoy a good 1985. Appliance manufacturers have not and are not likely to integrate die casting into their manufacturing operations. They will, therefore, be relying on the custom die caster for components. The biggest threat to custom die casting comes from offshore competition. Just-in-time delivery can be expected to be a factor in the appliance industry within three years, and this applies to virtually all of the precision metal processes. (It is

a lot easier to control delivery from 300 miles away than from 3000.) Offshore die casters are eroding domestic custom die casting business by providing parts ready for assembly, including secondary machining, finishing and sub-assembly.

According to Werner Meyer, president of the Zinc Institute, "To some extent, zinc die castings are again being considered in the appliance industry because the price volitility of the mid 1970's is becoming history. Appliance engineers are again willing to look at zinc for very valid reasons as we promote the use of thin wall zinc die castings which provide less costly, lighter parts with better quality."

One stamping producer who is noticing the impact of imports is Greene Manufacturing Co. of Racine, WI. According to Steven Garey, Greene's marketing manager, "The appliance industry is becoming more cost sensitive due, in part, to offshore competition. Appliance manufacturers are demanding more from their suppliers just as the auto industry is.

"We've tried some cost-saving measures on decorative trim packages, such as handles, accents and so on. We sell these items to makers of refrigerators, conventional and microwave ovens and trash compactors. In one case, we were able to reduce the cost of wood-grain freezer door handles by 25% by using pneumatic fixturing we developed ourselves. The fixturing eliminated some press operations and helped us trim labor costs."

Greene Mfg. produces a wide range of stampings, including progressive stampings. Being tied closely to the appliance industry, Garey is looking forward to a good 1985, but believes whoever occupies the White House will have a big influence on the nation's economy and therefore the sales of consumer durables such as home appliances.

Some interesting trends can be seen from the data in the accompanying tables. The *"Trends and forecasts"* table shows actual shipments of major home appliances for the years 1980 through 1983 as reported by the Association of Home Appliance Manufacturers (AHAM). Totals for the balance of 1984 and 1985 are estimates. Referring to the shipments total, one can readily see the effect of the recessionary period of the early 1980s. Starting in 1983, however, a definite upward trend is evolving.

Trends and forecasts-Factory unit shipments of major appliances[1] (Domestic + export)

Product	1980	1981	1982	1983	1984[2]	1985[2]
Room air conditioners	3,203	3,693	2,761	2,002	2,647	2,796
Dehumidifiers	673	536	440	437	480	500
Dishwashers	2,738	2,484	2,170	3,093	3,328	3,302
Built-In	2,354	2,193	1,956	2,831	3,072	3,062
Portable	384	291	214	262	256	240
Disposers	2,962	3,179	2,780	3,544	3,800	3,880
Compactors	235	191	148	157	184	192
Refrigerators	5,124	4,944	4,364	5,316	5,814	5,920
Freezers	1,751	1,605	1,340	1,288	1,283	1,352
Upright	789	717	614	607	607	637
Chest	963	889	726	680	676	715
Electric ranges	2,530	2,328	2,036	2,754	3,013	3,045
Free-standing	1,975	1,829	1,619	2,190	2,400	2,425
Built-in	555	498	417	563	613	620
Microwave oven/ranges[3]	3,608	4,422	4,071	6,114	7,320	7,250
Washers	4,550	4,365	4,019	4,616	4,840	4,933
Automatic	4,426	4,277	3,955	4,546	4,840	4,933
Wringer & other	124	88	64	69	NA	NA
Dryers	3,177	2,977	2,727	3,294	3,540	3,599
Electric	2,494	2,337	2,143	2,622	2,812	2,861
Gas	682	640	548	672	728	738
Total shipments	**30,330**	**30,482**	**26,683**	**32,405**	**36,019**	**36,519**

[1]In thousands of units [2]Forecasts as of March, 1984
[3]Includes U.S. produced and imported microwave ovens and combination microwave oven/ranges
Note: Figures may not add due to rounding and overlapping product categories. Data from AHAM

The leaders in this upward trend are dishwashers, microwave ovens and automatic washers. Shipments of other types of washing machines have dwindled to virtually zero.

The projection for the balance of 1984 shows an increase in total shipments of nearly four million units over 1983, and the estimate for 1985 is nearly half million above 1984.

The table showing costs of precision metal products consumed by the appliance industry follows the same general trends. What it does not show are changes in productivity. As an example, the use of aluminum and aluminum-based alloys appear to have stagnated at $17.6 million from 1977 to 1982. But in 1977, that $17.6 million bought 30.9 million pounds of aluminum product for washers and dryers. In 1982, it bought less than half that amount, 15.0 million pounds. Some of this apparent loss in productivity is due to the price of aluminum ingot, which rose 47% in the period from 1977 to 1982. More of this increase in raw material should have been absorbed by improvements in parts fabricators productivity. But capital improvments are difficult to justify in an economic recession. Nobody wants to take risks on an uncertain future, further proof that a stable economy is essential to our survival as an industrial power.

Costs of some precision metal products consumed by the appliance industry (in millions of $ delivered cost)

	1977	1982	(est) 1985
For household ovens and ranges			
Metal stampings	27.5	30.1	44.2
Castings (iron-gray and malleable)	.8	N/A	1.5
Castings (aluminum and aluminum-based alloy)	6.6	41.7	61.3
Castings (zinc and zinc-based alloy)	N/A	.2	.3
For household refrigerators and freezers			
Castings (aluminum and aluminum-based alloy)	8.3	N/A	15.6
Metal stampings	25.8	N/A	48.5
For household washers and dryers			
Castings (iron-gray and malleable)	17.6	25.8	37.9
Castings (aluminum and aluminum-based alloy)	17.6	17.6	25.9
Castings (zinc and zinc-based alloy)	7.4	.5	.7
Metal powders	1.6	N/A	3.0

Note: These totals do not include captive producers.
Sources: U.S. Census Bureau, Predicasts, AHAM.

A wide range of precision metal parts are used in gas ranges. This unit, a Vesta Crest 30SP uses stampings, die castings, roll formed shapes and extrusions. Pilotless ignition, now virtually standard on all gas ranges, offers new markets for stampings and P/M parts used for transformers and other electrical inductors. Photo courtesy of Athens Stove Works.

Office equipment/computers

Swingline, the office stapler manufacturer is so optimistic about 1985, that it will soon take delivery of an automatic die casting system. This will join three conventional die casting machines with two robots that are used to produce the die cast zinc bases for Swingline's model 747 stapler.

The totally automated die casting machine-robot combination casts, extracts, quenches, trims and punches holes that cannot be cored. It also deburrs flash from the finished die casting. The result of using this automated die casting system is a net shape part, ready for painting and assembly.

Swingline also produces 97% of its progressive die stampings, in-house. Fourslide stampings are purchased from outside sources.

Executives at two powder metal parts producers are also optimistic about the office equipment market for 1985. Both have added pressing and sintering capacity to keep up with the demand for magnetic parts used in dot matrix printers and other office equipment.

One of the P/M producers recently installed five P/M presses to increase its capacity. The presses produce very small magnetic P/M parts for use in 12 and 18-dot matrix printers.

Mechanical and hydraulic compacting presses, sintering furnaces and machining equipment are all on the 1985 shopping list for a California P/M producer that makes parts for computer printers.

Interest rates will have a bearing on 1985 office equipment sales, believes a marketing official at Crenlo Inc., a Rochester, MN, producer of sheet metal housings for office machines as well as office furniture. Crenlo roll forms steel frame channels for use in office desks, computer printer stands and racks.

If Crenlo's orders start picking up in 1985, the firm will go to two plant shifts rather than buying new stamping and roll forming equipment, according to Crenlo executives.

Invincible Metal Furniture in Manitowoc, WI, is also holding off expansion plans until 1985's true colors show. Invincible already owns 10 stamping presses (for office furniture parts) and plans to buy additional presses and press brakes in 1986. It would also like to automate more processes in addition to spot welding, and would do so if the equipment were available.

No matter how the office furniture market shapes up, Invincible will continue to buy rather than produce aluminum and magnesium extrusions, according to officials in its mechanical engineering department.

Intelligent typewriters, switchboards and other communications gear and executive workstations could be the sales stars of 1985, according to John Dykeman, associate publisher of MODERN OFFICE TECHNOLOGY, a Penton/IPC publication.

"Personal computers will enjoy a good 1985," predicts Dykeman, "but we will start to see stiffening competition from network or clustered devices in large organizations." Future Computing, a market research firm, says 1985 is the year dollar sales volume of personal computers will exceed minicomputers.

In today's competitive office systems marketplace, as in virtually all other markets, you must be efficient, whether you are producing computers or office partitions.

A custom roll former in the Cleveland, OH, area says his firm keeps costs to a minimum when producing partition uprights and frame members through an efficient plant layout.

It is interesting to note that two of the major computer manufacturers we talked to had these views on obtaining component parts. One buys virtually all its metal parts from domestic outside sources. The other imports everything.

Costs of some precision metal products consumed by the electronic computing industry (in millions of $ delivered cost)

Process and material used	1977	1982	(est) 1985
Castings (iron-gray and malleable)	N/A	27.4	33
Castings (steel)	18.8	44.8	53.3
Castings (aluminum and aluminum-based alloy)	39.5	104.4	124.2
Castings (copper and copper-based alloy)	N/A	1.5	1.8
Castings (other nonferrous)	N/A	8.6	10.2
Metal stampings	67.4	92.4	110

Sources: U.S. Census Bureau, Predicasts

The IBM System 36 computer for small businesses uses a large number of small magnesium and aluminum die castings. P/M parts are used in disk drive mechanisms and stampings are used for structural and electrical applications. Extruded aluminum heat sinks are used to dissipate heat from solid state devices.

If sales of Swingline's model 747 stapler take off in 1985, so will the demand for the stampings and zinc die castings that make up the product. Swingline will be ready with a total of four automated die casting lines to produce stapler bases and other parts for products in its office equipment line.

Shelving/Vending machines

Sales of metal shelving and related products in the U.S. in 1985 should increase only slightly over 1984, according to forecasts at the Econoscope Group. The forecasters say shelving producers have recovered from the big 1982 slump in 1983-4.

Marketing officials at Lyon Metal Products in Aurora, IL, report that shelving orders from dealers for the first quarter of 1985 are just matching year-earlier totals. For now, Lyon is maintaining its current roll forming and stamping lines. No big capital spending projects are planned for early 1985.

As far as materials that go into Lyon's products are concerned: it is shifting to galvanized steel for clips, latches and small supports on some of its shelf assemblies; and for some out-of-sight parts, prefinished steel is replacing cold rolled steel.

"Expanding like crazy" is how an official at Parsteel Products describes the scene at its Chicago Hts., IL plant. A 38,000 ft^2 plant expansion, for producing shelf uprights, are signs of Parsteel's optimism for 1985. The new equipment could help the company generate 35% more business in 1985. Parsteel produces cantilevered heavy-duty shelving, light-gauge pallet racking and other material handling products.

Forgers, stampers, and die casters can expect continued business from vending machine producers in 1985, according to G. Richard Schreiber, the president of the Chicago-based National Automatic Merchandising Association. In his words, he is "...quite bullish for all of 1985. There will be new installations as well as replacement of existing units with more sophisticated models."

Metal parts will continue to play an important role in vending machine operations, especially as newer models become more sophisticated with microprocessors, LED displays, video screens and human voice synthesis.

Automatic Products Co. of St. Paul, MN, anticipates strong sales in 1985, so it has added new coil feeding equipment to its blanking presses. Automatic's chief engineer reports that it will continue to buy zinc die castings and aluminum extrusions from custom producers. Die castings and extrusions are used for structural parts inside the machines, as well as for decorative trim on Automatic's line of candy and cigarette machines. For exterior components, metal parts offer security plastics generally cannot match economically.

Costs of some precision metal products consumed by the shelving industry (in millions of $ delivered cost)

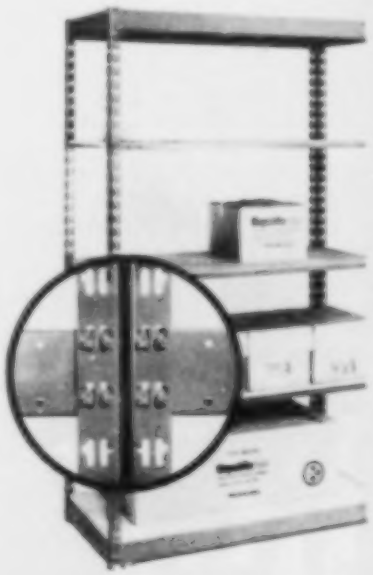
Process and material used	1977	1982	(est) 1985
Alloy steel mill shapes (except stainless)	6.0	10.1	14.3
Aluminum and aluminum-based alloy mill shapes	12.8	14.8	21.0
Copper and copper-based sheet, plate, bar, tubing and castings	6.2	1.7	2.4

Sources: U.S. Census Bureau, Predicasts

Costs of some precisen metal products consumed by vending machine industry (in millions of $ delivered cost)

Process and material used	1977	1982	(est) 1985
Castings (nonferrous other than aluminum and copper)	N/A	2.3	3.2
Metal stampings	7.8	5.5	7.6
P/M parts	2.6	N/A	5.3

Sources: U.S. Census Bureau, Predicasts



A new concept in shelving construction is Republic Steel's Wedge-Lock® shelving system. A stamped and embossed lug and slot design (see inset) is used to attach the shelves to the upright members.

Industry reports

By Donald Farley, associate editor
Randolph Gold, editor

Die casting

"Today's domestic die casting industry faces many challenges, some of which either did not exist five years ago, or did not represent significant importance regarding the industry's continued prosperity," observes Peter A.R. Findlay, president of the American Die Casting Institute (ADCI).

"The important thing here is that we are seeing a tremendous growth in die casting as a whole. The buyer is becoming more aware of a quality product and is looking at die casting to achieve this."

Some of these current challenges, which most other metalworking industries must contend with as well, include just-in-time delivery, higher quality standards, improved productivity and increased foreign competition.

The ADCI is organizing an expanded marketing program directed toward developing new die casting applications as one method of offsetting the loss of existing markets to foreign suppliers. Secondly, the Die Casting Research Foundation, the technical arm of the ADCI, is hoping to intensify its research program. Increased life of die steels, improved alloy castability, better physical and mechanical alloy properties, computer technology integration and upgraded capital equipment are its goals. Finally, more effective means of conveying technological developments throughout the die casting industry are needed to ensure its continued prosperity. "This is a basic educational problem," notes Findlay, "which we anticipate will be addressed by joint cooperative projects with this Institute's sister organization, the Society of Die Casting Engineers. There is no doubt that this is an industry partnership whose time has come."

Industry sales of $6.75 billion, representing a 12.4% increase over 1983, are projected by Findlay for 1984. The use of die cast metals will also show growth, particularly in the area of magnesium. According to Walter Treiber, president of Chicago White Metal Casting, Inc., Bensenville, IL, "As far as new applications for die casting are concerned, I think we're seeing a tremendous resurgence in new products and new designs, especially in the area of magnesium die casting. I see this carrying over very favorably into 1985 in the electronics, computer and defense industries. In fact, we could well see a growth in magnesium die casting of 60 to 65% in 1985."

Findlay credits increased magnesium use in part, to several new automobile applications. A new three-piece magnesium die cast grill in the 1984 Pontiac Fiero, and magnesium die cast air cleaner covers in the 1984 Corvette, account for a portion of the sales.

Zinc is not yet back to the production levels of the late 1970s, but is headed in the right direction. "There is no doubt that data for the past 18 months confirms zinc's

Die casting shipments (1000s of tons)

Metal	1982	1983	1984[1]
Aluminum			
Custom	260	322	420
Captive	231	259	295
Zinc			
Custom	159	188	198
Captive	107	109	112
Magnesium			
Custom	3.55	4.5	5
Captive	.63	.8	1

Source: American Die Casting Institute
[1]Projected

"We know the job that has to be done. I'm sure our industry will embrace new management and marketing methods, and available technologies to ensure our industry's continued prosperity."

comeback in its fierce competition with plastic materials," says Findlay. "Zinc's unique physical and mechanical properties, and the perception by die casting customers that zinc components represent a top quality product, have stimulated growth. We are probably looking at a 2 to 4% annual growth in zinc use.

"In terms of aluminum, there has been a substantial growth of 26% for the first six months of 1984, over the same period of 1983," continues Findlay. "A strong growth in aluminum die casting is expected to continue in 1985, but possibly at a slightly lower rate than 1984."

Overall sales for the die casting industry may see a minimal decrease in 1985, according to Findlay. "Based on the performance of the industry in 1983, and all the general economic signals we're getting, there might be a very minor slow down in 1985, but solid sales will continue," predicts Findlay. "There is a reasonable amount of optimism for good automotive sales in 1985. We also see continuing growth in the use of die castings in instruments, industrial machinery and equipment, and in the computer fields."

According to Treiber, "The important thing here is that we are seeing a tremendous growth in die casting as a whole. The buyer is becoming more aware of a quality product and is looking at die casting to achieve this." Evidence of Chicago White Metal's confidence in the future of die casting is seen in constant capital improvements. "We're continually improving our equipment here by purchasing new die casting machines and expanding our facilities," adds Treiber. "In fact, we're in the process of building a complete new engineering research and development center which is about 60% complete."

The path the die casting industry must follow next year and beyond is clear. "We know the job that has to be done," states Findlay. "I'm sure that our industry will embrace new management and marketing methods, and available technologies to ensure our industry's continued prosperity." But words will do little good. As a Midwestern die casting executive exclaimed, "This industry must reduce the conversation and start acting now!"

"This industry must reduce the conversation and start acting now!"

Capital equipment
Die casting machines

According to our survey of die casting machine builders, both the sales and number of machines on order are heavily in favor of cold chamber machines in the 100 to 2000 ton category. This implies gearing up for production of larger aluminum die castings, probably for the automotive market. It is interesting to note that sales for the first half of 1984 are almost equal to all units shipped in 1983, a sign of growth in the die casting machine industry.

Hot chamber machines (Size in tons of locking force)	Units shipped in 1983	Units shipped first half of 1984	On order for 1985
Under 100	3	3	—
101 - 250	7	3	2
251 - 400	11	10	2
401 - 550	1	—	—
551 - 700	—	2	—
Cold chamber machines			
101 - 250	10	9	2
251 - 400	15	9	4
401 - 550	12	12	6
551 - 700	8	7	9
701 - 850	—	2	—
851 - 1000	1	1	1
1001 - 2000	7	2	1

Extrusion

A substantial increase in extrusion sales is not projected for the coming year. According to Dona Sanford, executive director of the Aluminum Extruders Council, executives in the industry feel the present market is sluggish, but appears to be building slightly. "Demand for pounds of extruded aluminum is expected to increase by about 2% in the fourth quarter of 1984. Business for 1985 is looking better, but nothing significant is expected. We might see growth of 1% in aluminum pounds extruded for the first half of 1985. Dollar volume will increase a little better than that because we see the price of aluminum rising by the second quarter next year."

Herbert Schuler, president of General Extrusions, Inc., Youngstown, OH, believes business performance for late 1984, will remain fairly consistent with the same time period in 1983, but cautions that this will depend in large part on what happens to interest rates. "I don't feel inflation is going to be a factor, and I don't think the supply and demandof aluminum is going to be very influencing either. This is because the extrusion industry tends to serve construction, automobile and appliance markets, for example, which are interest sensitive. So assuming there is not a dramatic change in the interest rate structure, I think business is going to hold its present level or improve slightly in the next six months to a year."

Imported raw materials for aluminum extrusion will continue to influence the market place in 1985. "With the strength of the dollar, the imports are getting much more attractive. This has had a depressive effect on the price of aluminum," notes Schuler.

"Yes, imports are a real problem," relates Sanford, "and are going to get worse unless something positive is done. We do not see a decrease in overseas aluminum production for the simple reason that foreign producers, if not operated by their governments, are at least government subsidized, keeping production up and prices down."

Extruded product shipments (millions of pounds)

	1983	1984
January	157.6	207.6
February	164.7	204.6
March	194.9	220.7
April	185.4	209.4
May	182.5	223.0
June	198.3	219.9
July	185.2	207.7
August	213.2	228.0

Source: U.S. Dept. of Commerce, Bureau of the Census

Capital equipment and materials

Extrusion lubricants

Based on our survey of extrusion lubricant suppliers, the sales of lubricants during the first half of 1984 is up slightly from the same period in 1983. Assuming the demand for lubricant is proportional to production, the extrusion industry has stabilized and should be up somewhat in 1984.

Today, users of extrusions are closely following the price of metal. "An educated buyer is seeing these prices reduced and pressuring the extruder to reduce prices accordingly. The problem is that this buyer does not have a full understanding of what happens between the primary price and the end product price," relates Sanford. Tolerances on the final extruded shape, twist and length (if cut by the extruder), all affect the cost per pound of a product. In addition, many extruders provide secondary finishing operations such as painting, silk-screening and anodizing, all of which add to the price of a finished product.

With improved economic conditions this year, and continued stability expected in 1985, industries have again begun to expand, adding capital equipment as needed. But this is not the case for many extruders. "Companies with high demand will obviously expand," states Schuler. "But most extruders are just hanging on to the capital equipment they have. The recession caused them to cut back to the bone. Business for General Extrusions is better than it was a year ago, and last year was our best year. But as far as capital expenditures, there will be no large projects going on because we recently added a new manufacturing facility in Georgia and are still filling it up with orders, as well as maintaining our Youngstown plant."

"With the strength of the dollar, the imports are getting much more attractive. This has had a depressive effect on the price of aluminum."

Sanford also sees limited capital improvements. The bite of the recession is still prevalent on the minds and balance sheets of many extruders. "People are running very tight inventories, very short lead times and watching their pennies and waiting. This is not a time to be overcommitted in any single area. Yes, the general market is stable, but people are cautious."

Forging

Although business for the forging industry has improved, uncertainty about 1985 is the prevailing feeling among many in the industry. According to Peter Georgeson, president of Scot Forge Co., Spring Grove, IL, and president of the Forging Industry Association, "Some people in the impression die business are doing very well right now. In my opinion, they are tied closely to the automotive industry, which certainly has improved. But no one really knows whether this will last through 1985. Forgers are all hopeful, but I don't think there is any great wave of confidence. Many of us are at a lower volume of business than we certainly would care to be."

George Sincerny, vice president and sales manager of Keystone Forging Co., Northumberland, PA, says his business has suffered the last few years, but not to the degree of many of his competitors due to a more diversified customer base. "Even though sales were down the last two years, we managed to stay out of serious trouble. We're a job shop so we tend to follow the general economy. That is, we're not heavily into automotive or aircraft, but pretty much across the board. This diversity has probably given us more stability than some of the shops that are closely tied to one industry. This year we are looking for a 15% improvement in business over last year, and of course last year was pretty bad. But we have definitely had a big upturn this year. We probably hired back 50 to 75% of the people we lost during the recession."

The Wyman-Gordon Co. of Worcester, MA, weathered the recession due, in part, to its forging diversity within the defense industry, says its vice president of sales and marketing, Jack Odell. Present defense sales are very good and expected to carry over into 1985. "The defense business is quite excellent overall," claims Odell. "We certainly are not enjoying the build rates of 60 F-14, and over 100 F-15 aircraft per year that we had in the mid 1970s. Today, the build rate may be 40 to 50% of those levels. But programs like the B-1 and the C-5A, which are doing very well at present, really complement those basic aircraft programs. Business is winding down for nuclear carriers, but the submarine markets have been quite good. The military spares market has also been doing well."

"Most of us feel that we're in an industry which not only for this year, or next year, or maybe the next ten years, is going to have its tough times."

The sluggish sales period of the recession was used by Wyman-Gordon to make capital improvements, clear evidence of the company's faith in imminent economic recovery. "We've made tremendous amounts of improvements in capital equipment," exclaims Odell. "We purchased a Ruthner horizontal press which will basically be used to cog titanium ingot into forging billets. We've also put in our own titanium melting facility, and bought substantial interest in a titanium ore facility in Washington. In addition, a good portion of equipment at our East coast facility was refurbished, including a 50,000 ton press which we reconditioned ourselves." Odell added that his company is fully aware that it might take some time to recover the improvement costs, but feels it was worth it due to confidence in the high technology industries it serves.

Use of advanced technologies such as CAD/CAM, will become more important to the forger if his business is to remain competitive in the 1980s and beyond. Most progressive forgers employing such technology are in the beginning to middle stages of implementation. Upon full development, CAD/CAM will improve the forger's pro-

Forging shipments (millions of $)

	Impression Die		Open Die	
	[1]1983	1984	[1]1983	1984
January	172,153	190,188	39,291	45,277
February	174,892	197,071	41,708	47,898
March	185,962	241,871	50,326	56,138
April	135,245	222,052	42,462	53,383
May	173,283	222,762	45,083	50,032
June	177,510	238,583	36,172	63,648
July	137,359	196,955	36,696	36,909
August	164,831	203,564	43,511	57,927

Source: Forging Industry Association [1]Adjusted

ductivity by reducing the lead time needed from part conception through to actual die production. Closer tolerance dies produced in less time than by more conventional methods, is further evidence of the increased efficiency resulting from the use of CAD/CAM.

"Imports will continue to disrupt the industry," notes Georgeson. "We feel there are many unfair trade practices that must be addressed. We are not asking for protectionism, but just that fair trade practices are used and enforced." The Alliance of Metalworking Industries, in which the forging industry plays an active part, is doing whatever lobbying possible to obtain legislation that will develop these fair trade practices.

"Most of us feel that we're in an industry which not only for this year, or next year, or maybe the next ten years, is going to have its tough times," predicts Georgeson. "But the hopes we have for the future include the fact that many things tend to work like a pendulum. When there is a downswing, we know there has to be an upswing, and forgers intend to be ready for it. Good times or bad, the strong will survive, and I'm sure most of the people in the forging industry feel that way."

Capital equipment
Forging machines

The sales of forging machines (hot and cold headers, upsetter and forge rolls) were reasonable in 1983, very slow in 1984, but should pick up in 1985, according to our survey. No forging machine sales were reported for the first half of 1984, but units on order for 1985 total 38% of all units shipped in 1983. The largest number of forging machines sold in 1983 were in the one in. capacity category, followed by 2 ½ in. capacity.

Capital equipment
Forging presses

Only mechanical forging presses were reported sold or on order, according to the respondents of our forging press survey. The largest number of presses sold in 1983 were in the 501-1000 ton range, while units shipped during the first half of 1984 were equally split among the 501-1000, 1001-2000 and 2001-3000 ton ranges. Units on order for 1985 represent a higher total number than all of those shipped in 1983.

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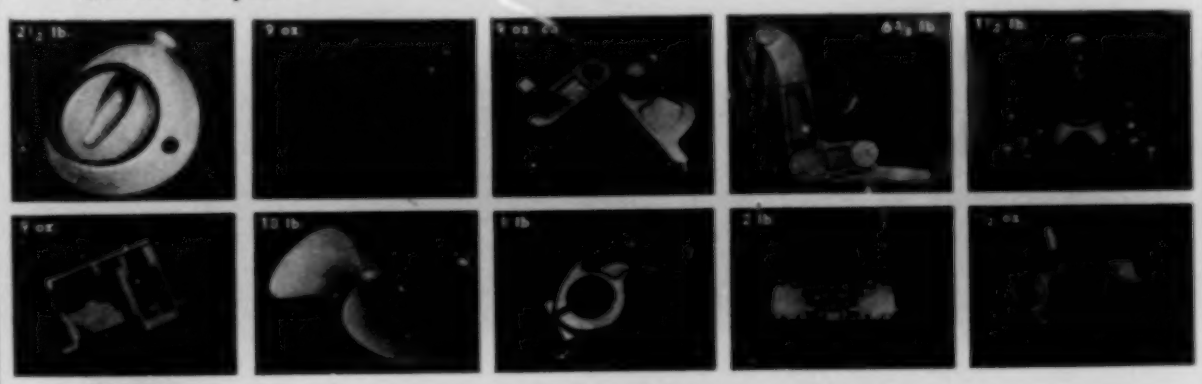

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Investment casting

The stability of pre-recession days is returning to the investment casting industry. According to Henry Bidwell, executive director of the Investment Casting Institute, business for the commercial end of the industry has begun to move toward heights not seen in four years. But many in the industry have suppressed their optimisim about 1985, still recovering from the sting of the recession.

"My statistics seem to indicate a healthy increase in business this year over 1983," observes Bidwell. "Sales are increasing 20% per annum which is precisely the same sort of figure we were getting in the late 1970s, after many years of limited growth for an industry. One or two of those growth years we were closer to a rate of 40% per year, and then came the recession. The overall effect of that for most investment casters was a leveling off of sales. But some companies were badly hit because they chose to limit their markets to one industry and that industry happened to be clobbered by the recession. Investment casters with a broader base of customers were not as badly hurt. However, no one was rejoicing."

E.K. Zielke, vice president of Stainless Foundry and Engineering, Milwaukee, WI, and president of the Investment Casting Institute, believes the purchase of capital equipment just prior to the recession proved harmful, if not fatal to quite a few investment casting businesses. "Things were booming. Sales kept going up as if there were no end in sight. Then the recession hit and business dried up. Many investment casters that designed their shop for the never ending requirement of the automotive industry were badly hurt. In addition, many of them went out of business because they expanded and then did not get the sales to support the expansion. Right now, most of the investment casters that expanded prior to the recession are finally nearing capacity. They are growing into what they have put in their plants in the last few years."

Current business activity seems to indicate growth will be swift. The first half of 1984 saw commercial investment casting net sales increase 20% and bookings increase by 50% over the same time period of 1983.

A major portion of the investment casting industry, gas turbine engine components and airframe structures, is also witnessing a healthy resurgence. Mike Higgins, vice president of sales and marketing at Howmet Turbine Components Corp., Greenwich, CT, is pleased with recent business activity. "The airfoil market, which comprises blades, vanes, and one-piece integrally cast rotors, nozzles and compressor stators, has picked up significantly over 1982 and the first half of 1983." Higgins attributes the rally to spare part requirements for popular, mid-sized transport engines, and the upturn in military business due to increased defense requirements.

Howmet has continued to upgrade its facilities, invest in capital equipment and maintain its high technology research and development activities through some tough economic times. "We continually enhance and expand our operations," explains Higgins, "because we have confidence in the future of the air transport business and aerospace, in general."

According to Bidwell, if the economy continues to improve on a broad basis, business in the investment casting industry will not only keep pace with it, but might possibly improve at a faster rate due to its cost efficiency. "A finished component can be made to a net or near net shape at a substantial cost savings than if it was done by another process which may waste raw materials. Investment casting a part will probably result in a better design also. The engineers got the message, the process has expanded and the technology and mechanics of investment casting have improved."

User replacement of inventories is another reason to remain optimistic about the future, believes Zielke. "As business for the user improves, he will have to replenish inventory, at least in part, because most casters cannot cast and deliver the parts as fast as orders demand. So slowly but surely, the customer's inventory will grow.

"Today, investment casters may be pacing themselves in order to see what is going to come in the future," says Zielke. "But in general, I can only see that investment casting is going to grow and there is no getting around that. It is a process of the future."

Capital equipment Investment casting wax injectors and extruders

According to our survey of investment casting wax injector and extruder manufacturers, 1984 will finish a much brighter year than 1983. Orders received for 1985 point to good business for these equipment makers in the year to come. Wax extruder sales are down somewhat for 1984, and none were reported on order for 1985.

Equipment (by type)	Units shipped in 1983	Units shipped first half of 1984	On order for 1985
Wax injectors	34	32	25
Wax extruders	9	4	—

Powder metallurgy

The American automobile industry is strengthening along with the general economy in 1984. Sales are up, a lengthy UAW strike did not materialize and projected sales for 1985 look promising. To the P/M industry, which depends on the automobile industry for consumption of 60% of its output of iron and copper-based P/M parts and products, this is welcomed news. According to R. William Rosenquest, vice president of marketing, New Jersey Zinc, and Metal Powder Industries Federation (MPIF) president, "Iron P/M is going to set an all time record for production this year. There is more iron powder being sold today than I have ever seen in all my years in the P/M business. One reason for this is that the automotive industry is very strong presently."

Future automotive P/M also appears encouraging. New developments include the imminent use of P/M forged connecting rods and the design of a P/M camshaft made from a chromium nickel molybdenum steel. Sintered friction materials used in automobile metallic and semi-metallic brake disk pads and linings, is another market beginning to emerge for the P/M industry. About 4,800 tons of iron powder are currently used in this application each year.

The MPIF's industry development program is also playing a part in record iron powder production. A major concern of this program is to promote the use of P/M in new markets resulting in less dependency on the automobile industry. "So far it's been a very effective program," notes Rosenquest. "We're trying to reach every conceivable industry that uses fabricated parts. There may come a time when we're going to zero in on one particular industry, but right now the MPIF is trying to get the word out on P/M to the broadest base possible because the process is applicable in almost every industry."

Some markets being pursued include ordnance, biomedical, watches, computers and business machines. These are prime candidates for the injection molding of metal powders, which is on the verge of substantial commercial production. This method is being developed by an increasing number of P/M parts makers, and is suited for smaller, complex parts made from 316L stainless steel, nickel iron alloys, tungsten carbide and M-2 tool steel.

Ronald Socia, general sales manager of RB&W Powdered Metal Products Div., Coldwater, MI, believes competition and economic hardships have led many businesses that may have overlooked P/M in the past, to consider it now and in the future. "There is more and more value analysis being used today than in years past due to foreign competition and, in part, the recession. The big push is on to increase efficiency and economize wherever possible in terms of product design and the manufacturing process. The P/M process offers economic advantages, including the ability to make parts to near net or net shape resulting in less raw and machined material waste."

Use of copper-based powder in P/M is not expected to change much in 1985. "That market, while it is better because the economy has improved, is a small market and is much more stable," explains Rosenquest. "It doesn't have the high swing potential that iron powder does because there is not that much copper-based powder that is used in the automotive industry."

MPIF projections indicate about a 25% growth in iron powder shipments in 1984. Molybdenum, tungsten and nickel powders, which registered gains in 1983 are also expected to do well in 1984. "Unless the economy takes a nose dive," concludes Rosenquest, "I think the metal powder industry is slated for big things in 1985. I'm very optimistic. This is what I see happening and what I feel can happen."

Capital equipment P/M compacting presses

The respondents to our survey on P/M compacting presses reported a larger number of units shipped during the first half of 1984 than were shipped in all of 1983. A substantial number of units were reported ordered for 1985. All compacting presses reported, either shipped or on order, are of the mechanical type.

Powder shipments for P/M parts [1](1000s of tons)

	1979	1980	1981	1982	1983	[2]1984
Iron powder	158	116	134	111	154	190
Copper and copper base powder	23	16	19	14	18	21

Source: Metal Powder Industries Federation [1]Rounded [2]Projected

Roll forming

The stifling effects the recession had on the roll forming industry are wearing off and business prospects for the industry appear encouraging. Yet few roll formers are prepared to adopt a totally optimistic attitude for 1985.

According to Charles Freel, president of Teledyne Metal Forming, Elkhart, IN, certain areas of roll forming seem to be stabilizing. "More standard roll formers like ourselves, that are not involved in automotive or appliance roll forming, are not struggling. We are starting to see activity in aircraft we haven't seen in several years. There is more sales activity in the petro-chemical industry also. But basically we have a wait-and-see attitude regarding the future because the present is not what I would like to call a growth time. Our potential customers are still uncertain about which way the economy is going to go. We are just trying to reclaim business that was there in the late 1970s.

"I am not pessimistic about the remainder of 1984," continues Freel. "I believe sales are going to stay about the same, and we can't complain because we did rebound back from the recession days. But business is just not the same as it was in 1979. When we get back to that level, I'm going to be happy."

The more conventional areas of roll forming may also show some limited improvement in 1985. According to Nigel Eiloart, president and general manager of Brockhouse Canada Ltd., Bramalea, Ontario, and chairman of the Custom Roll Forming Institute (CRFI), "The automotive roll former's business has peaked, and still looks good for 1985. The appliance industry will probably also do fairly well next year. Roll formers in construction, agricultural machinery and railroad materials, though, are not looking for great improvement in 1985 over 1984, and 1984 is not looking particularly bright either."

"Roll forming is a growing industry and there is no question about that."

The high costs and long lead times of raw material shipments will continue to plague the roll forming industry in 1985. The troubles stem from a limited number of raw material suppliers selling to a large number of roll formers. The situation has been worsened by the roll former's maintenance of the smallest inventory of raw materials possible, a vestige of recession days.

Custom roll formers have had, and will continue to have, a difficult time finding and keeping qualified employees. Robert Boeddener, president of the CRFI, maintains this is a chronic problem within the industry. "As soon as a roll former trains an individual, he has many job opportunities in and out of the roll forming industry because he is a very capable machine operator and therefore very mobile." Offering ever increasing pay may help retain the employee, but hurt the business by reducing the amount of funds to be reinvested in the company in order to remain competitive. "There is a constant juggling between staying competitive and holding on to good people," adds Boeddener.

The custom roll forming industry is based on building new tools for new shapes. After the average life of a new shape has expired, which may be 4 to 5 years, the roll forming customer will then redesign products for the market, retool and make new products. "We must depend on people spending new monies to build new tools to roll sections on," says Freel. "Since about 1981, people have done little designing or redesigning of new products that would require new

1984 Roll forming business conditions (% of respondents)

	Steel		
	1st Quarter	2nd Quarter	3rd Quarter
Business is excellent	17%	16%	11%
New orders increasing	40%	38%	27%
Future looks better	52%	28%	27%
	Nonferrous		
	1st Quarter	2nd Quarter	3rd Quarter
Business is excellent	18%	24%	18%
New orders increasing	20%	22%	21%
Future looks better	41%	21%	21%

Information for the business conditions study, conducted monthly by the Custom Roll Forming Institute, is gathered from custom roll formers throughout the industry. The numbers indicate the percentage of companies out of 100% that answered a particular question in the manner shown. For example: an average of 17%, out of 100% of the respondents to the survey, felt their steel roll forming business was generally excellent for the first quarter of 1984.

tooling for us to add to the line. But now they are starting to spend the tool money, and this is why I feel 1985 is going to be a very good year for us. People have just waited too long to recapitalize some of their tooling."

Lost business is returning to the roll forming industry and new customers are developing, renewing the confidence of the roll former. 1985 may not be a record breaking year, but it will continue on a upward trend. "Roll forming is a growing industry and there is no question about that," notes Eiloart. "Steady improvements in technology, such as microprocessor machine control, will certainly play a role in the custom roll formers future. This is likely to provide better quality, and will allow us to make more complicated parts in less time, lowering our costs and enabling us to pass this savings on to the customer."

Capital equipment Roll forming machines

Respondents to our survey on roll forming machines indicated that sales of capital equipment in this industry are doing a little better during the first half of 1984 than 1983. In all but one capacity range, shipments for the first half of 1984 are at least half of all units shipped during 1983. Number of units on order for 1985, while not staggering, are substantial for this type of capital equipment.

Machines (by number of roll stations)	Units shipped in 1983	Units shipped first half of 1984	On order for 1985
5 - 8	41	24	4
9 - 12	18	10	3
13 - 15	2	2	—
16 - 20	32	22	1
21 - 25	3	—	—
Over 25	—	1	—

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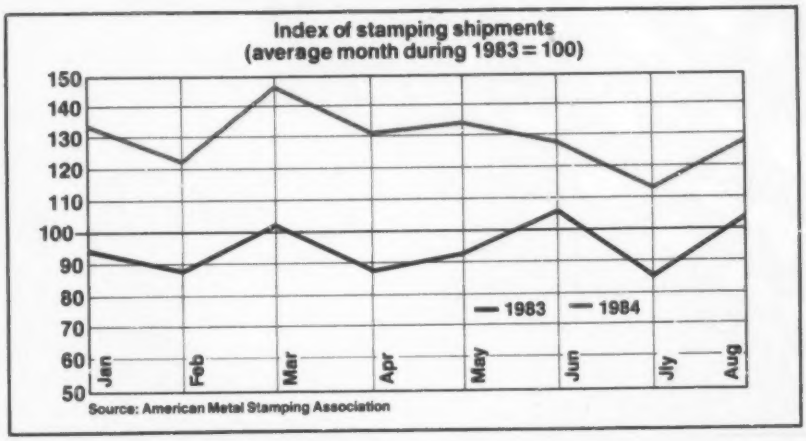
Stamping

"Depression years," is how Mike Carroll, president of Koller Mfg. Corp., Milwaukee, WI, described the business environment for the stamping industry from 1980 through 1982. "If someone would have told me in 1979, our biggest sales and profit year, that business would have been as bad in the early 1980s as it turned out to be, I would not have believed it. Times were really tough for Koller and most of my peers other than those involved in electronics stamping. The volume was way off for most of us. Certain customers were not paying their bills, and we were concerned about the possibility of a number of these accounts going into bankruptcy."

The recession did, however, have a positive effect on many industries, including stamping. It made businesses recall the importance of satisfying the customer. "Out of this recession came a thing called customer service," suspects Carroll. "I think many of us in the stamping industry forgot this because we went through an inflationary period where we could pass any price increase on. Not only did we have the opportunity to pass on raw material increases, which would increase three to four times a year, but I think we found ourselves in a position where we could also pass on our inefficiencies. The recession certainly changed that. All of a sudden, quality became very important and deliveries improved.



We have also had to exercise better inventory control. It was forced on us. We're probably much more business oriented coming out of this recession than going into it. This applies to Koller, and I see this with our competitors also."

According to Jon Jenson, president of the American Metal Stamping Association, the quality of the product has become a crucial factor in recovery and survival. "One of the continuing challenges in our industry for this year, next year and beyond, will be improvement in productivity, and of course a good portion of that will be an improvement in quality. I think we are seeing some significant steps being taken by our membership to do just that in the form of programmable press controls, increasing use of robotics and implementation of statistical process control. I think these are the big trends in our industry which will probably keep us healthier, longer."

Jenson is optimistic about stamping sales for the remainder of this year and next year, but detects a moderate decline in growth. "As of the end of July, orders, shipments and backlogs for the industry have left us with some very encouraging indications for the second half of 1984. Our backlog in July rose to the highest level in history, which means good things for the balance of the third quarter and certainly does not say anything negative about the fourth quarter. Almost regardless of what happens in the last quarter, 1984 is going to be a good year.

"The best projections we can come up with now lead us to believe 1985 will not be quite as good as 1984," adds Jenson. "This is based on general economic trends which tell us that automotive will slow, and this industry represents half of our market."

Current forecasts indicate general economic growth should continue into 1985. To an industry that tends to parallel the economy, such as stamping, this is certainly encouraging news. "Since our industry is so diverse and so completely involved in every facet of the economy," observes Jenson, "the stamping industry does reflect what is going on generally."